Abstract

The object of this invention is to realize the new configuration of antenna and the electric power feeding method which substantially suppress the generation of standing wave and consequently to provide a discharge apparatus to generate plasma having an excellent uniformity, a plasma processing method for large-area substrate, and a solar cell manufactured with a high productivity. The present invention is composed of a plurality of U-shaped antenna elements having a power feeding end and a grounded end which are arranged to form an array antenna in such a way that the grounded end and the power feeding end are alternately placed in parallel at regular intervals on a plane, wherein the alternating current electric powers with the same excitation frequency are simultaneously fed to the power feeding ends with the phase shift of 180 degrees between adjacent power feeding ends, the excitation frequency of the alternating current power is 10MHz - 2GHz, and the length of the conductor is set so that the measured ratio of reflected wave to incident wave is 0.1 or less at the power feeding end. It is also possible to determine the length La of straight conductor to hold the inequality: $0.5(1/\alpha) < La < 10\ (1/\alpha)$. Here, α (1/m) is a attenuation coefficient.